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ABSTRACT

A physical fitness curriculum, designed to provide cumulative benefits in a sequential pattern, is based upon a framework of a conceptual structure. The curriculum's ultimate goal is the achievement of greater physiological efficiency through a holistic approach that would strengthen circulatory-respiratory, mechanical, and neuro-muscular efficiency. These components of the fitness curriculum are illustrated in the framework by thinking, feeling, and acting components, involving: (1) a knowledge of what physical fitness entails in terms of physiological efficiency; (2) an understanding of the necessity of applying the knowledge of physical fitness in day-to-day life; and (3) a realization of the necessity of movement in physical fitness. The model of this conceptual structure is divided into three parts: physiological concepts, psychosocial concepts, and activities concepts. Diagrams illustrate each of these concepts with accompanying outlines of the subconcepts implicit in each; training results emerging from designated physical activities; and the long-term beneficial physical changes resulting from extended participation. (JD)

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A PROPOSED CONCEPTUAL FRAMEWORK FOR CURRICULUM DESIGN IN PHYSICAL FITNESS

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ABSTRACT

Physical education programs have been challenged to improve the level of physical fitness of all Canadians. Unfortunately there is little evidence to suggest that many current programs accomplish this as they do not prepare students to cope with the knowledge explosion, help them learn how to learn, or help them to become self-directing in the fitness area. The proposed conceptual framework provides an orderly scheme for fitness concepts. These concepts can become themes that recur throughout a fitness curriculum in a cumulative and often overlapping way so they can be taught each year in increasing depth. By starting with fundamental experiences and gaining comprehension and depth in a sequential pattern, the fitness curriculum has the potential to grow with the student.

A PROPOSED CONCEPTUAL FRAMEWORK FOR CURRICULUM DESIGN IN PHYSICAL FITNESS

INTRODUCTION

Although the physical needs of the human body have not changed in recent times (Astrand and Rodahl, 1970), technological alterations have resulted in more sedentary work and increased leisure for Canadians. Lower levels of physical fitness and higher incidence of heart and other degenerative diseases have accompanied these changes. As a result, physical education programs have been challenged to improve the level of physical fitness of all Canadians (Bailey, 1973; Goode, 1976).

Upon closer examination, it appears that the real challenge is not to provide vigorous and demanding activities that contribute to high levels of physical fitness but to encourage people to make physical fitness an integral and lasting part of their lives. This is unlikely to occur in most people unless they develop a thorough understanding of physical fitness while involved in school physical education programs. Unfortunately, there is little evidence to suggest that many current programs accomplish this; frequently they offer "fitness units" but make no real attempt to develop any valid understanding of fitness concepts. Too often, the student is armed with isolated physiological facts but is unsure where or if they fit into the fitness mosaic.

CONCEPTUAL APPROACH

The use of a conceptual approach can help an individual to better understand the fitness mosaic and the interdependent and independent roles of each of its parts. Traditional physical education has often concerned itself with the teaching of isolated facts, skills and rules which the student learns by rote memorization or repetition without necessarily seeing them as part of a whole - a part of his life (Willgoose, 1974). Many recent program approaches to fitness have been no different and as such do not realize their full potential since they do not prepare students to cope with the knowledge explosion, help them learn how to learn, or help them to become self-directing in the fitness area.

A conceptual structure allows fitness knowledge to be organized so that information can be categorized and learning simplified. It is important that students find meaningful relationships among fitness ideas rather than struggling with facts in isolation. It has been acknowledged that to teach a skill without making clear how it relates to and evolves from the broader fundamental structure of a field of knowledge is unproductive and that an unconnected set of facts has a pitifully short half-life in memory (Bruner, 1960).

An orderly scheme provided by a conceptual structure can supply a base from which learners can cope with expanding knowledge in the fitness area. New data can be organized so that individual facts become parts of larger ideas that can be connected with facts

and situations an individual has already learned and experienced. These concepts can become themes that recur throughout a fitness curriculum in a cummulative and often overlapping way so they can be taught each year in increasing depth. By starting with fundamental experiences and gaining comprehension and depth in a sequential pattern, the fitness curriculum has the potential to grow with the student.

Concepts are critical in the educational process because every subject has a structure which provides the underlying simplicity of things. These concepts permit the learner to categorize information in order to reduce the complexity of the environment, to identify the objects in the world around him/her, to reduce the necessity of constant learning, to provide direction for instrumental activity and to order and relate classes of events (Bruner, 1960). Physical fitness is no exception; similar to any other subject area it can be organized conceptually.

JEWETT'S MODEL FOR CURRICULAR DECISIONS

Dissatisfaction with the state of physical education prompted Jewett (1973) to seek a conceptual framework for making curricular decisions to help meet the needs of learners of all ages. The key purpose concepts of Jewett's (1973) conceptual analysis appear in Table 1.

TABLE I

KEY PURPOSE CONCEPTS

MAN MASTER OF HIMSELF: Man moves to fulfill his human developmental potential.

Physiological Efficiency: Man moves to improve or maintain his functional capabilities.

Circulorespiratory Efficiency. Man moves to develop and maintain his circulatory and respiratory functions.

Mechanical Efficiency. Man moves to increase and maintain his range and effectiveness of motion.

Neuromuscular Efficiency. Man moves to maintain or improve his muscular function.

Psychic Equilibrium: Man moves to achieve personal integration.

Joy of Movement. Man moves to derive pleasure intrinsic to human motion.

Self-Knowledge. Man moves to gain self-understanding and appreciation.

Catharsis. Man moves to release tensions and frustrations precipitated by the pressures of modern living.

Challenge. Man moves to test his prowess and courage through physical activity.

MAN IN A SOCIAL WORLD: Man moves to relate to others.

Communication: Man moves to share ideas and feelings with others.

Expression. Man moves to convey his ideas and feelings.

Clarification. Man moves to enhance the meaning of other communications forms.

Masking. Man moves to obscure his intent or emotion.

Group Interaction: Man moves to function in harmony with others.

Teamwork. Man moves to share in common movement goals.

Competition. Man moves to vie for individual or group goals.

Leadership. Man moves to motivate and influence group members to achieve common goals.

Cultural Involvement: Man moves to take part in movement activities which constitute an important part of his society.

Participation. Man moves to develop his capabilities for taking part in movement activities popular in his society.

Movement Appreciation. Man moves to understand and become an appreciative observer of sports and expressive movement forms.

Cultural Preservation. Man moves to understand and extend his cultural heritage.

IN SPACE: Man moves to adapt to and control his physical environment.

Spatial Orientation: Man moves to relate himself in three dimensional space.

Awareness. Man moves to construct a conception of his body and how it moves in space.

Relocation. Man moves to propel or project himself from one place to another in a variety of settings.

Relationships. Man moves to regulate his body position in relation to stationary and moving objects and persons in the environment.

Object Manipulation: Man moves to give impetus to and to absorb the force of objects.

Maneuvering Weight. Man moves to support, resist or transport mass.

Object Projection. Man moves to impart momentum and direction to a variety of objects.

Object Reception. Man moves to intercept a variety of objects by reducing or arresting their momentum.

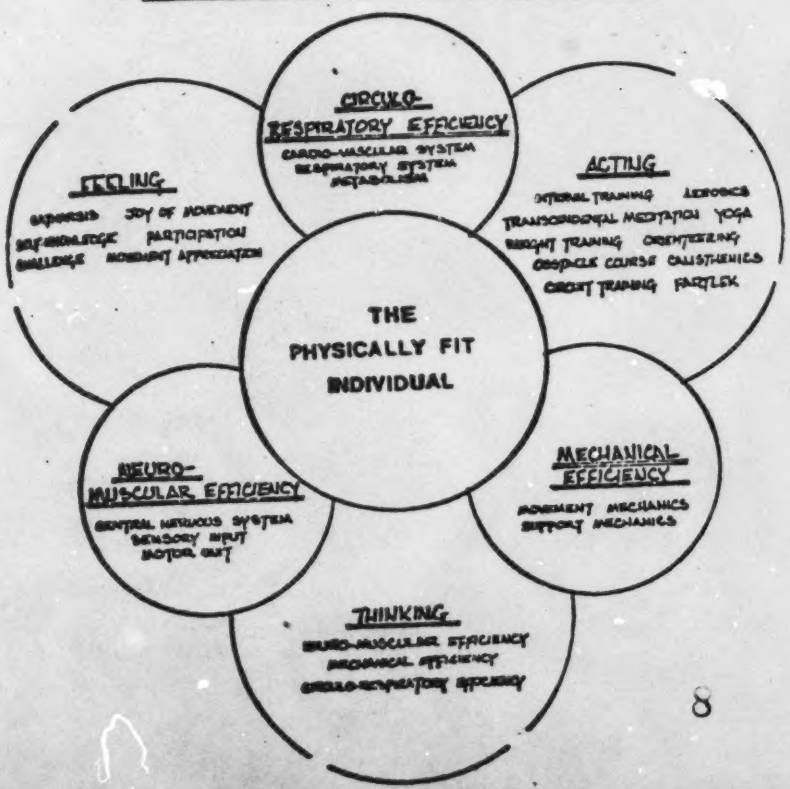
Jewett anticipated that this conceptual framework could serve as a basis for defining the content of physical education. Since this was one of the most comprehensive physical education conceptual frameworks available and physical fitness is undoubtedly an integral part of physical education, Jewett's model was used as the basis for the proposed physical fitness conceptual framework.

PHYSICAL FITNESS CONCEPTUAL MODEL

It was assumed that the ultimate aim of a physical fitness curriculum was an individual who was able to perform his daily tasks and activities with greater ease and less fatigue because he had achieved greater physiological efficiency through response as a whole thinking - feeling - acting being (Diagram 1).

Diagram 1

PHYSICAL FITNESS CONCEPTUAL MODEL



As illustrated by the model, it was decided that physical fitness consisted of the following components:

1. Circulatory-respiratory efficiency, which by definition was concerned with circulatory and respiratory functioning and therefore dealt with cardiovascular, respiratory and metabolic responses of the body to physical activity.
2. Mechanical efficiency, which by definition was concerned with range of effectiveness of motion and therefore provided for movement and support mechanics.
3. Neuro-muscular efficiency, which by definition was concerned with motor functioning and as such dealt with nerve-muscle interaction.

Since an individual's potentiality is realized through his response as a 'wholistic being", it became necessary to enhance these physiological components as illustrated by the thinking, feeling, and acting components of the model.

A knowledge of what physical fitness entails in terms of physiological efficiency, as well as bodily response to physical activity is a prerequisite to an understanding of the need for physical activity as an integral part of today's lifestyle. This essential part of physical fitness is represented by the "thinking" component.

The "feeling" component of the model indicates the necessity of applying the knowledge of physical fitness in one's day to day life. Attitudes and values determine how physically active an individual will be as he strives for personal integration and social

and cultural involvement.

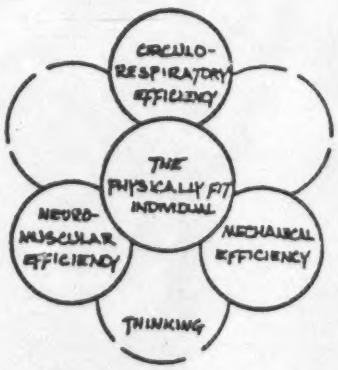
The emphasis in physical fitness should be on movement. There are numerous activities available for physical participation to appeal to individual interest and circumstance as exemplified by the "acting" component of the model.

PHYSICAL FITNESS CONCEPTUAL FRAMEWORK

With the preceeding model in mind, Jewett's key purpose concepts from Table 1 were analyzed. The proposed framework began with an identification of Jewett's concepts that were considered crucial to an understanding of physical fitness. They were eventually grouped and further developed as physiological, psychosocial, and activity concepts.

PHYSIOLOGICAL CONCEPTS

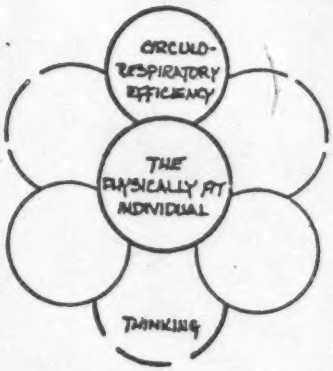
The diagram illustrates that the Physiological Concepts of Circulo-Respiratory Efficiency, Neuro-Muscular and Mechanical Efficiency and the "Thinking" component of the Physical Fitness Model are closely interrelated. An understanding of these concepts is necessary if an individual is to develop his physical fitness potential.



1. Physiological Efficiency: Man moves to improve or maintain his functional capabilities.

   A. Circulo-Respiratory Efficiency: Man moves to develop and maintain circulatory and respiratory functioning.

The diagram illustrates that the Physiological Concept of Circulo-Respiratory Efficiency and the "Thinking" component must occur together. The learner must have a working knowledge of the concept if it is to become an integral part of a liftstyle.



1. Training results in changes in circulo-respiratory efficiency.

   a. Cardiovasular response to stress of exercise.

Subconcepts	Immediate Change	Long-Term Change
Cardiac Output	increase in heart rate	potential for increased cardiac output
	increase in stroke volume	
Myocardial Change		increase in size and strength of the heart muscle
		higher stroke volume at all levels of activities
		decrease in heart rate at a given level of activity
Blood Distribution	increased circulation to the working muscles through vasoconstriction of the arterioles supplying the inactive areas of the body and the vasodilation of the arterioles supplying the active muscles	capacity to better distribute blood
Vascularization		possible increase in size and number of capillaries to facilitate more effective blood distribution to the working muscles and myocardium

Subconcepts	Immediate Change	Long-Term Change
Blood Pressure Regulation	increase in systolic pressure due to increased cardiac output but vasodilation of arteries prevents a diastolic rise thereby minimizing changes in mean blood pressure	blood pressure at same work load as well as resting pressure is lower because of reduced resistance to blood flow
Temperature Regulation	increased body temperature	greater skin blood flow
	cutaneous vasodilation which allows more blood flow and increased transportation of heat to the skin where it can be lost to the environment	
Blood and Body Fluid	blood volume decreases because of an increase in blood pressure which forces the fluid into the extravascular space	blood volume is increased
		red blood cells increased
		hemaglobin increase
Neural Changes	sympathetic dominance which increases heart rate and stroke volume	vagal dominance which serves to inhibit heart rate

b. Respiratory response to stress of exercise.

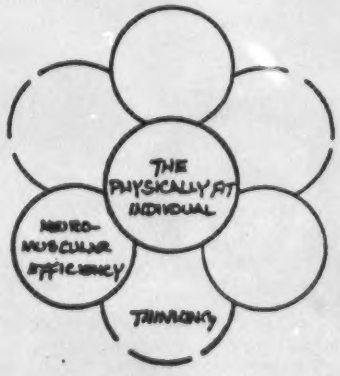
Subconcepts	Immediate Change	Long-Term Change
Ventilation Volume	tidal volume increases	higher maximal respiration rate
	increase in frequency of breathing	tidal volume increase
		resting volume increase
Alveolar Ventilation	greater gas exchange because of greater tidal volume	improved gas exchange because of greater tidal volume and increased alveolar-capillary surface area
Gas Diffusion	increased gas diffusion because of increased pressure gradient and increased movement of blood	larger diffusion capacity at rest and during work because of opening of more alveoli and capillaries

c. Metabolic response to stress of exercise.

Subconcepts	Immediate Change	Long-Term Change
Energy Production		
1. ATP-PC System	rapid breakdown of phospho-creatine to ATP	increased capacity to store and break down ATP and PC increased tolerance for lactic acid
2. Anaerobic Pathway (Lactic Acid System)	breakdown of glucose (carbohydrates) to ATP and lactic acid	increased capacity to break down glucos. increased tolerance for lactic acid
3. Aerobic Pathway (Oxygen System)	breakdown of glucose (carbohydrates), fats, and proteins to ATP, CO_2, and H_2O	increased capacity to break down carbohydrates, fats, and proteins
Energy Utilization	ATP is utilized to provide energy for working muscles	increased ability to utilize ATP

B. Neuro-Muscular Efficiency: Man moves to develop and maintain motor functioning.

The diagram illustrates that the Physiological Concept of Neuro-Muscular Efficiency and the "Thinking" component should occur together. The learner must have a working knowledge of the concept if it is to become an integral part of a lifestyle.

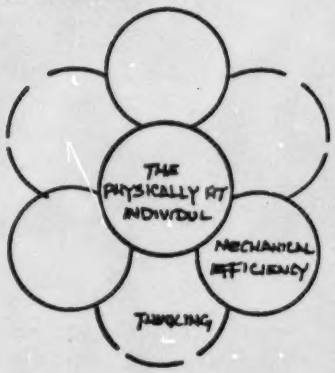


1. Training effects changes in neuro-muscular efficiency.

Subconcepts	Immediate Change	Long-Term Change
Central Nervous System Voluntary Movement	impulses are transmitted to the muscles and cerebellum. Proprioceptors in the muscles send signals to the cerebellum where a comparison of two sets of information is made. An impulse from the motor cortex is elicited and the movement is executed	the motor patterns are established (engrams) and stored for immedate recall and replaying
Motor Unit	motor neurons transmit impulses to the muscle fibres they innervate according to the type of movement to be executed - slow twitch units in low tension, slow-moving or endurance exercises and fast-twitch units in fast, powerful movements.	endurance training results in hypertrophy of slow-twitch fibers and and increase in oxidative capacity because of an increase in mitochondria. A decrease in size of the less frequenly recruited fibers prevents an increase in total muscle strength. Strength training results in hypertrophy of the contractile component due to an increase in size of myofibrils brought about by increased synthesis of protein responsible for muscle shortening and tension development.
Sensory Input in Movement	proprioceptors provide feedback to the CNS with regard to kinesthesis and posture	improved relaying of information to the CNS which can modify the action of muscle groups for smooth, coordinate, accurate movements.

C. Mechanical Efficiency: Man moves to develop and maintain range and effectiveness of motion.

The diagram illustrates that the Physiological Concept of Mechanical Efficiency and the "Thinking" component must occur together. The learner must have a working knowledge of the concept if it is to become an integral part of a lifestyle.

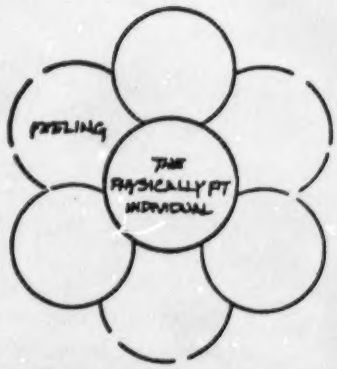


1. Training results in changes in mechanical efficiency.

Subconcepts	immediate Change	Long-Term Change
Movement Mechanics (Flexibility)	the cartilage absorbs fluid	cartilage becomes thicker
	ligaments, tendons, and muscles stretch	ligaments and tendons increase in size and strength
		muscles become more supple and pliable
Support Mechanics (Posture)		
1. Mechanical Principles	an awareness of physical laws that apply to the human body	potential to perform more and better work with less energy while avoiding strain or injury in such daily activities as lifting, carrying, pushing, pulling sitting, standing, and lying
	a good feeling gained as a result of proper application of body mechanics	
2. Correction of Postural Syndromes	the shortened connective tissue on one side and the weakened muscle on the other which causes most postural syndromes are stretched and contracted respectively when correct postures are assumed	the shortened connective tissue and muscles are stretched and the weakened muscles are strengthened (lengthening - strengthening principle to regain muscular balance of forces)

PSYCHO-SOCIAL CONCEPTS

The diagram illustrates that the "Feeling" component of the Model is concerned with the Psycho-Social Concepts and their influences on the development of physical fitness



I. Psychic Equilibrium: Man moves to achieve personal integration.

A. Self-Knowledge: Man moves to gain self-understanding and appreciation.

1. It is desirable to know one's present status and needs and how physical fitness can serve one now and in the future.

Subconcepts	Potential Change
Evaluation/Assessment Techniques	an understanding of physical fitness and possible programs to maintain or improve physical fitness may lead to the development of and adherence to a personal physical fitness program.
Self-Image	as physical appearance, bodily functions, motor performance, and capacity for participation in physical activities change with the development of physical fitness, a more positive self-image may result.
Lifestyle	an analysis of one's lifestyle (with respect to eating patterns, exercise habits, leisure activities, and use of mood modifying substances) and its effect on health may encourage the development and maintenance of personal optimal health through the adoption of an appropriate lifestyle.

B. Catharsis: Man moves to release tension and frustration.

1. Physical activity influences the body's ability to maintain the homeostasis balance - the adaptation potential of the body.

Subconcepts	Potential Change
Exercise as Stressor	some kinds of stressors may enhance the body's ability to cope with other stressors. Exercise as a stressor elicits responses from the body through progressive conditioning and produces changes in body function. Thus, the body and vital organs are strengthened, and the functioning of the glandular system, especially the adrenal glands which produce steroids to counteract stress, is improved. These changes may serve as protective or adaptative mechanisms when the body is forced to mobilize its resources and increase its energy expenditure under the influence of another stressor.
Physical Activity and Stress	physical activity assimilates the hormones produced by the body as a response to stress. The build-up of these hormones will eventually incapacitate the body's organs and exhaust the body's ability to adapt. Thus, in times of stress the individual can turn to physical activity as a release.

C. Joy of Movement: Man moves to derive pleasure from movement experiences.

1. Positive, enjoyable exposure to physical activity will assist in the formation of positive attitudes toward physical activity.

Subconcepts	Potential Change
Skilled Movement	motor skills that are properly learned provide lasting value in the formation of solid kinesthetic experiences which enable the learner to develop a deep appreciation for that skill. It is this "warm" feeling for the skilled movement that furnishes the drive to engage in it again and again.
Positive Exposure	the desire to participate in physical activity throughout one's life can best be generated through early, positive exposure to physical activity. Thus pleasure and good feelings from movement along with opportunities to overcome a challenge provide the potential for continued participation in physical activity during and after the school years because it is an enjoyable experience and gives rise to that vibrant, dynamic feeling that comes from being more than just well.

Subconcepts	Potential Change
Self-Expression	movement is a mode of man's self-expression in which his total being is integrated and involved. The mythic intensity of physical activity and the self-awareness that it can bring, joins body, mind and spirit in the dance of existance. Limitations are surpassed and boundaries crossed as man undergoes personal and social transformation in physical activity. This "rebirth of self" occurs as one becomes involved in the physical activity and experiences the flow of energy in and about his body. The bodily joy that one can experience will result in "running for the sake of running".

D. Challenge: Man moves to test his prowess and courage.

1. Physical activity provides an opportunity for the individual to fulfill the need to challenge himself, others and the environment.

Subconcepts	Potential Change
Self-Concept	Man, in order to remain vibrant and alive, must have opportunities to tax and test himself physically and mentally. Physical activity provides a socially acceptable medium to satisfy this need.

II. Cultural Involvement: Man moves to take part in movement activities which constitute an important part of his society.

A. Participation: Man moves to develop his capabilities for taking part in movement activities of his society.

1. Being physically fit allows greater participation in physical activities which in turn promotes physical fitness.

Subconcepts	Potential Change
Cultural Values	human movement reflects culture and physical activities provide an opportunity for active participation in one's culture. Societal and cultural systems within a society determine movement behavior. Thus, acceptability of movement skills reflect cultural values. It is becoming increasingly acceptable to jog, work out, or play sports and thus more people are engaging in these activities.

Subconcepts	Potential Change
Manifest/Latent Values	physical activity may hold different manifest and latent instrumental values for individual participants. Few people will engage in physical activity solely for the purpose of developing physical fitness. To encourage participation, and concomitantly the development of physical fitness, it may be necessary to stress other values of physical activity.
Participation Benefits	as one becomes aware of and appreciates the benefits to be derived from participation, the potential for continued participation in physical activities to maintain physical fitness and lead a fuller life is enhanced.

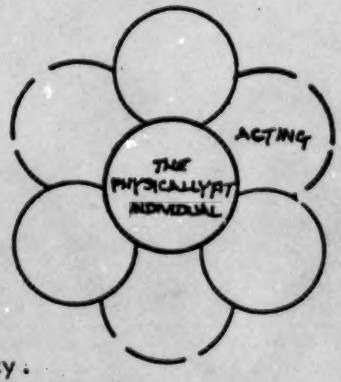
B. Movement Appreciation: Man moves to become knowledgeable and appreciative of sports and expressive movement forms.

1. Physical fitness permits the individual to be more active in a greater number of activities.

Subconcepts	Potential Change
Range of Movement Skills	a repertoire of movement skills is a prerequisite to increased knowledge and appreciation of physical activities.
Intrinsic Value of Fitness	a "physically fit body" brings with it an intrinsic value and appreciation for movement

PHYSICAL FITNESS ACTIVITIES

The diagram indicates that the "Acting" component is necessary because personal involvement must occur if physical fitness activities are to become a part of a lifestyle.



I. Activities to Develop Physiological Efficiency.

A. General Statement: The human body undergoes changes or adapts to a stress placed upon it. If the body is forced to repeatedly adapt to increasing levels of physical stress such as exercise beneficial and long-term effects will result.

B. Training Principles

1. The effects of training are influenced by different variables.

   a. Overload

   b. Specificity

   c. Intensity

   d. Frequency

   e. Duration

   f. Regularity

   g. Warm-Up

   h. Cooling Out

C. Activities to Develop Circulo-Respiratory Efficiency

1. Aerobics are activities that condition the heart, lungs, and vascular system

   - running
   - jogging
   - walking
   - skipping
   - cycling
   - swimming
   - hiking
   - cross-country skiing
   - orienteering (foot, ski, cycle)
   - some sports and games which involve sustained movement or can be modified so that there is more continuous play

2. Interval Training

3. Fartlek

D. Activities to Develop Neuro-Muscular Efficiency

1. Weight Training (isotonic)

2. Isometric Exercises

3. Iso-Kinetic Exercises

4. Calisthenics

5. Obstacle Course

6. Sports and Games

E. Activities to Improve Mechanical Efficiency

1. Flexability Improvement

a. Static Stretching

b. Balanced Exercise Program

2. Posture Improvement

a. Balanced exercise program to maintain muscle strength and endurance, flexibility, and circulo-respiratory endurance

b. Specific exercises for body parts out of alignment

II. Activities to Encourage a More Active Lifestyle

A. Psychic Equilibrium

1. Activities Designed to Increase Self-Knowledge

a. Physical Fitness Testing

b. Exposure to Various Fitness Programs

c. Maintenance of Records of Changes in Personal Fitness

d. Analysis of One's Lifestyle and Effect on Health

2. Activities Designed to Reduce Stress

a. Recreational Pursuits such as Tennis, Cycling, Swimming

b. Muscle Relaxation Techniques such as Jacobson

c. Sensitivity Training such as Yoga, Transcendental Meditation

3. Activities to Generate Joy of Movement

Every program can give rise to joy of movement. It is not something that can be taught. Rather it is an experience. The participants have a crucial role. Programs to ellicit joy in movement experiences must therefore be constructed around variables which influence the feelings of the participants. Thus, a program provides for:

a. the student as an individual
b. a non-threatening environment since learning is enhanced
c. opportunities for realistic success (positive self-image)
d. a sound knowledge base as it can help actualize potentialities

4. Activities Designed to Fulfill the Need to be Challenged

   a. Discussion of man's need to be stimulated and the role physical activity can play

   b. An encouragement to challenge oneself in order to improve performance

   c. Competition with others within the context of improving oneself

B. Cultural Involvement

   1. Activities to Encourage Participation

      a. Discussions as to why people participate in physical activity.

      b. Pleasurable and joyful experiences in physical activities is perhaps the ideal way to ensure participation

   2. Activities Designed to Foster Movement Appreciation

      a. Exposure to wide range of physical activities but not to the detriment of developing competence in a few activities

SUMMARY

It appears that physical fitness has an identifiable body of knowledge which can be conceptually structured. If is difficult to conclude that the proposed framework is complete in its entirety. However, it is not intended as a definitive statement but as a starting point. Although it is hoped that it can be of much use as a blueprint for the development of a physical fitness curriculum, it remains at an exploratory moment still in need of refinement.

References

Astrand, P. and Rodahl, K. Textbook of Work Physiology. New York: McGraw Hill, 1970.

Bailey, D.A. "Exercise, Fitness, and Physical Education For The Growing Child - A Concern", Canadian Journal of Public Health, Vol. 64, Sept./Oct., 1973, pp.421-430.

Bruner, J.S. The Relevance of Education. New York: W.W. Norton and Co. Inc., 1971.

Bruner, J.S. The Process of Education. Vintage Books, 1960.

Goode, R.C. "Observations and Suggestions on The Physical Fitness of Our School Children". Address Delivered To The 53rd Convention of Canadian Education Association, Halifax, September 24, 1976.

Jewett, A.E. "Physical Education Objectives Out of Curriculum Chaos", Curriculum Improvement In Secondary School Physical Education. Proceedings AAHAPER Regional Conference, 1971, pp.39-60.

Willgoose, C.E. The Curriculum In Physical Education. Dubuque, Iowa: Wm. C. Brown Co., 1974.